Docket No.: MSFT-2955/307064.01 App. No.: Not Yet Assigned Title: SYSTEMS AND METHODS FOR FRAGMENT-BASED SERIALIZATION Inventors: F. Soner Terek, Ajay Kalhan, Nagavamsi Ponnekanti, Srikumar Rangarajan, and Michael J. Zwilling Attorney: Nathaniel Ari Long Phone: (215) 568-3100 Sheet 1 of 8 Record Format Payload HEADER Soc. Sec. Height Weight Name **PAYLOAD** Fragment 1 (Primitive (Binary Fragment) Members) Non-Record Format Payload HEADER Fragment 2 **PAYLOAD** (No Payload) HEADER Fragment 3 FIG. 1

Filed: Herewith

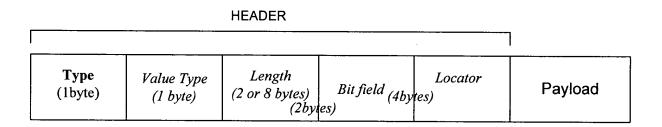


FIG. 2

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```
class tPerson
                  string;
   m name
                  int;
   m_age
                 tSetOfAddresses;
   m_locations
                                       // This is a collection or multiset.
};
class tAddress
   m street
                  string;
   m city
                  string;
   m_zip
                  string;
};
class tEmployee: tPerson
   m_empNo
                  string;
   m_dept
                  string;
   m_photo
                  image;
};
Class tPartTimeEmployee: tEmployee
   m_hoursPerWeek
                         int;
};
```

FIG. 3

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Emit Terminator Fragment

Nested Members

FIG. 5

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Generating Fragments for Collection Members

Generate Collection Start Fragment Set Bit Field to Indicate Ordered or Unordered Collection Set Bit Field to Indicate Ordered or Unordered Collection Generate Fragment(s) for **Each Collection Element** Include Locator Field With First Fragment of Each Collection Element **Generate Terminator** Fragment for Collection Elements with More Than One Fragment

FIG. 6

Generate Terminator
Fragment to Indicate End of
Collection

Generating Fragments for LOB and FS Members

Place LOB or FS member in Fragment

Set a Bit in the Type Field to Indicate LOB or FS Fragment

Set a Bit in the Value Type Field to Indicate Pointer, Inlined, or Delayed Value Type

Emit the Fragment

FIG. 7

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Serializing an Entire Object

Place All Primitive Members, Except LOBs, in a Binary Fragment (see Fig. 4 and Fig. 5)

Set Type Field of Binary Fragment to Indicate an Object Type

Place Any LOB or FS Member in a LOB or FS Fragment (see Fig. 7)

Place Any Collection Members in Collection Fragment(s) (see Fig. 6)

If More Than One Fragment was Generated, Generate Terminator Fragment to Mark the End of the Serialization

FIG. 8

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Single Column of a Database

Objects	Data	Data

FIG. 9

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Metadata for Person Objects

Name	Phone #	Address	SS#	Weight
Person Object Re	ecords		•	
Henry	547-5268	2 N. 53rd St.	383-99-9876	230lbs
Margaret	549-9254	4 N. 67 th St.	398-74-4565	160lbs

(Prior Art)

FIG. 10

. 11(A)	Payload – SE Record Grayload – SE Record		Length (2bytes)	Type (1byte)
	Payload – LOB, Pointer, or Cell Reference	Length (2 or 8 bytes)	Value Type (1 byte)	Type (1byte)
11(B)	ŶFIG.			
	Payload – FS, Pointer, or Cell Reference	Length (2 or 8 bytes)	Value Type (1 byte)	Type (1byte)
11(C)				
()		IG. 11	\(F	Type (1byte)
	G. 11(E)	← FI	Bit field (2bytes)	Type (1byte)
	Payload – Collection Element	Locator (4bytes)	Length (2bytes)	Type (1byte)
11/F)	ŶFIG.			

← FIG. 11(H) Locator Type (1byte) (4bytes)

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Binary Fragment for tPerson

Binary Fragment for tEmployee

Binary Fragment for tPartTimeEmployee

Terminator for tPerson

FIG. 12